ADVANCED GRAPHING

Purpose:

The purpose of this experiment is to learn how to make plots of functions of several variables of the type:

1. Contour maps,
2. Surface plots; and,
3. Animations.

Equipment and Chemicals:

A connection through X windows to the campus RS-6000 running the PV-WAVE graphics program.

Directions:

See the instructor for directions on how to connect to the RS-6000 and load PV-WAVE.

Calculations:

PLOTTING A TWO-DIMENSIONAL FUNCTION

The following commands are for plotting the function, $z(x,y) = \frac{1}{2}x^2 + \frac{1}{2}y^2$, on a *xy*-grid of 101×101 points. Note that the $ symbol is used for line continuation.

1. At the WAVE> prompt type the following commands:

```
wave>  x = findgen(101)/5 - 10
wave>  y = x
wave>  z = fltarr (101,101)
wave>  for i = 0, 100 do begin & $
-      for j = 0, 100 do begin & $
-      z (i,j) = 0.5*x(i)*x(i) + 0.5*y (j)*y(j)

wave>  surface, z
```

note:

(a) a variable like *x* is written as **x (i)** on a grid, and likewise for *y*
(b) lines are continued by using a **$**

2. Describe the figure that is drawn and print it out.

3. Make a contour plot of the function by typing:

wave> **contour, z**

4. Describe the figure that is drawn and print it out.

MAKING A MOVIE!!

```
WAVE> navigator
.
.  read in `wf' which is a file containing 16×16×25 lines
.
WAVE>
WAVE> wf2 = reform(wf, 16, 16, 25)
WAVE>
WAVE> window, 1, xsize=300, ysize=300, title='movie'
WAVE> surface, wf2(*,*,0)
WAVE>
WAVE> tek_color
WAVE> frames=bytarr(300,300,25)
WAVE>
WAVE> for i = 0, 24 do begin surface, $
- color=9, $
- wf2(*,*,i), zrange=[0,0.30] & $
- frames(0,0,i)=tvrd(0,0,!d.x_vsize, $
- !d.y_vsize) & end
WAVE>
WAVE> movie, frames, order=0
WAVE>
```

5. Describe the movie that is drawn.

6. Use the above commands to make contour and surface plots of the following functions and print them out:

(a) $z(x, y) = x\sin(y) + y\cos(x) - \sin(0.25xy)$

(b) $z(x, y) = 0.5x^2 + 0.075x^3 + 0.0025x^4 + 0.5y^2$